



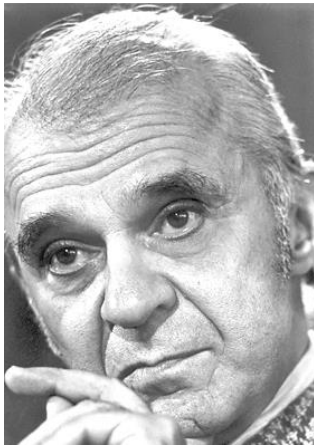
EE 552 : EE 552: Selected Topics in International Economics 2

Fundamental of Multiplier Analysis

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Input-Output Model

- Prof. Wassily Leontief (1906-1999) introduced the concept of “input-output” method for evaluating economy-wide impacts.
- Leontief was awarded the **Nobel Prize in 1973**.



The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 1973 was awarded to Wassily Leontief "for the development of the input-output method and for its application to important economic problems".

http://www.nobelprize.org/nobel_prizes/economics/laureates/1973/leontief.html

Main advantages of IO Model

- 1) It includes many different industries/sectors
- 2) The computed multiplier shows the ripple effects propagating via inter-industry network.

Input-Output Model

- The IO model is centered on the idea of inter-industry transactions:
 - Industries use the products of other industries to produce their own products.
 - For example - automobile producers use steel, glass, rubber, and plastic products to produce automobiles.
 - Outputs from one industry become inputs to another.
 - When you buy a car, you affect the demand for glass, plastic, steel, etc.

IO Conceptualization of the Economy

- The major conceptual step is to divide the economy into “purchasers” and “suppliers”.
- Primary Suppliers*: They sell primary inputs (labor, land, capital, etc.) to other industries. Payments to these suppliers are “primary inputs” because they generate no further sales. (example: Households)
- Intermediate Suppliers*: They purchase inputs for processing into outputs they supply to other firms or to final purchasers. (example: Automaker)
- Intermediate Purchasers*: They purchase outputs of suppliers for use as inputs for further processing. (example: Automaker)
- Final Purchasers*: Purchase the outputs of suppliers in their final form and for final use. (example: Households)
- *Intermediate Suppliers* and *Intermediate Purchasers* are the same thing!
- *Primary Suppliers* and *Final Purchasers* may or may not be the same entities. When they are the same (households), these activities are understood as separate activities.

The Problems with IO Analysis

Practical Issues

- *Data needs and complexity*: IO models are *tremendously complex* and *very data hungry*. This typically places these models in the hands of experts.

Theoretical Issues

- *Time/Data issues*: Usually a single year's data are used to develop the Total Requirements Table. But 1) purchases may actually reflect a longer term investment and 2) short term trends may impact the data.
- *Stability of the technical coefficients over time*: Technology changes, prices change, and demand changes, all affecting the coefficients in the Tot Reqs Table. This can impact the results if the coefficients are “out of date”.
- *IO assumes a linear relationship between increasing demand for inputs and outputs*: This assumes away 1) externalities and 2) increasing/decreasing returns to scale.
- *Industrial categorization*: IO models still assume that each industry 1) has a single, homogeneous production function and 2) each produces one product. These assumptions do not reflect the real economy very well.

The Power of IO Models

- Despite these problems IO analysis is a tremendously popular and powerful analytical tool.
- “The chief value of regional input-output analysis is in its descriptive analytical power.” (Bendavid-Val, p.113)
- “As a descriptive tool, input-output tables:
 - present an enormous quantity of information in a concise, orderly, and easily understood fashion;*
 - provide a comprehensive picture of the inter-industry structure of the regional economy;*
 - point up the strategic importance of various industries and sectors;*
 - highlight possible opportunities for strengthening regional income and employment multiplication.”* (Bendavid-Val, p.113)
- Urban Planners should be capable of understanding the structure, assumptions, and data requirements of Input-Output Analysis. While you may not be performing this analysis in your jobs, you almost certainly will come across this type of work sometime in your career.

Predictive Use of Input-Output Analysis

- Impacts are tracked throughout the economy
- **Multipliers** are derived from regional economic accounts

What are Multipliers?

Multipliers measure total change throughout the economy from a one unit change for a given sector.

Input-Output (Matrix Accounting)

Because of the accounting conventions adopted in the construction of an I/O transactions table, the following will always be true:

1. For each industry: Total output $\equiv$ Total input, that is, the sum of the elements in any row is equal to the sum of the elements in the corresponding column.
2. For the table as a whole: Total intermediate sales $\equiv$ Total intermediate purchases, and Total final demand $\equiv$ Total primary input

Note the use here of the identity sign, $\equiv$, reflecting the fact that these are accounting identities, which always hold in an I/O transactions table.

Reading across rows the necessary equality of total output with the sum of its uses for each industry or sector can be written as a set of 'balance equations':

$$X_i \equiv \sum_j X_{ij} + Y_i, \quad i = 1, \dots, n$$

where

X_i = total output of industry i

X_{ij} = sales of commodity i to industry j

Y_i = sales of commodity i to final demand

n = the number of industries

Input-Output (Matrix Accounting)

To go from accounting to analysis, the basic assumption is

$$X_{ij} = a_{ij} X_j \quad (\text{eq.2})$$

where a_{ij} is a constant.

Substituting (eq.2) into (eq.1) gives

$$X_i = \sum_j a_{ij} X_j + Y_i, i=1, \dots, n \quad (\text{eq.3})$$

as a system of n linear equations in $2n$ variables, the X_i and Y_i , and n^2 coefficients, the a_{ij} . If the Y_i – the final demand levels – are specified, there are n unknown X_i – the gross output levels – which can be solved for using the n equations.

Input-Output Multiplier

In matrix notation, (eq.3) is

$$X = AX + Y$$

which can be written

$$X - AX = Y \quad (\text{eq.4})$$

where X is an $n \times 1$ vector of gross outputs, A is an $n \times n$ matrix of coefficients a_{ij} , and Y is an $n \times 1$ vector of final demands, Y_i . With I as the identity matrix, (8.4) can be written

$$(I - A)X = Y$$

which has the solution

$$X = (I - A)^{-1}Y \quad (\text{eq.5})$$

where $(I - A)^{-1}$ is the inverse of $(I - A)$. This can be written

$$X = LY \quad (\text{eq. 6})$$

L is often known as the **Leontief inverse**, in recognition of inventor of i-o analysis

Backward Linkage and Forward Linkage Indices

$$X_1 = X_{11} + X_{12} + X_{13} + \dots + X_{1n} + F_1$$

$$X_2 = X_{21} + X_{22} + X_{23} + \dots + X_{2n} + F_2$$

$$\cdot \dots \cdot$$

$$X_n = X_{n1} + X_{n2} + X_{n3} + \dots + X_{nn} + F_n ,$$

The above set of equations can be succinctly represented in matrix format as:

$$X_i = \sum_{j=1}^n x_{ij} + F_i$$

Based on the above set of equations, the value of Input-Output coefficient or the technical coefficient (a_{ij}), which can be represented as matrix A.

$$a_{ij} = \frac{x_{ij}}{x_j} \quad A = \begin{bmatrix} a_{11} & a_{12} \cdots & a_{1n} \\ a_{21} & a_{22} \cdots & a_{2n} \\ \vdots & \vdots \cdots & \vdots \\ a_{n1} & a_{n2} \cdots & a_{nn} \end{bmatrix}$$

Backward Linkage and Forward Linkage Indices

Therefore, all transactions on the Input-Output matrix can be mathematically represented in matrix algebra.

$$AX + F = X$$

Also this identifies the relationship between sectoral production and demand.

$$X = (I - A)^{-1} F$$

The term of inversed matrix, i.e. $(I - A)^{-1}$, is Leontief multiplier. This term can be represented as matrix B , where each element (B_{ij}) indicates the influence from sector j to sector i .

$$(I - A)^{-1} = B = \begin{bmatrix} b_{11} & b_{12} \cdots & b_{1n} \\ b_{21} & b_{22} \cdots & b_{2n} \\ \vdots & \vdots \cdots & \vdots \\ b_{n1} & b_{n2} \cdots & b_{nn} \end{bmatrix}$$

Backward Linkage and Forward Linkage Indices

Likewise the overall forward influence along the chain of sector j is denoted as Forward multiplier as indicated in the following equation.

$$FORWARD_i = \sum_j b_{ij}$$

The value of Forward multiplier can be normalized and denoted as the Forward Linkage Index(FLI_i), which has the formula as follows.

$$FLI_i = \frac{\sum_j b_{ij}}{\frac{1}{n} \sum_i \sum_j b_{ij}}$$

Simplified China IO Table , 1997

	Agriculture	MineMetal	ConsGood	ChemMet	ManuConst	TranServ	HH	Investment	Rest of World	Total
Agriculture	39.64	0.68	77.35	7.45	1.50	7.51	103.61	9.26	4.08	251.07
MineMetal	0.51	5.19	2.45	48.33	13.65	1.96	0.91	-0.19	3.90	76.71
ConsGood	17.98	1.00	111.12	21.29	9.35	35.36	117.15	22.06	58.48	393.79
ChemMet	25.47	12.84	32.76	226.41	126.48	51.14	25.23	64.51	39.21	604.05
ManuConst	2.65	5.62	8.94	37.67	53.67	34.30	23.25	176.17	32.78	375.03
TranServ	13.10	7.28	30.52	52.42	37.26	80.59	187.01	7.52	13.86	429.55
Capital	29.66	24.77	64.15	90.79	69.23	121.41				
Labor	113.43	7.29	19.12	26.84	24.50	42.70				
TAX	4.69	4.40	25.00	34.42	13.48	47.32				
Rest of World	3.94	7.66	22.39	58.44	25.91	7.25				
Total	251.07	76.71	393.79	604.05	375.03	429.55				

A

0.1579	0.0088	0.1964	0.0123	0.0040	0.0175
0.0020	0.0677	0.0062	0.0800	0.0364	0.0046
0.0716	0.0130	0.2822	0.0352	0.0249	0.0823
0.1015	0.1673	0.0832	0.3748	0.3373	0.1191
0.0105	0.0732	0.0227	0.0624	0.1431	0.0798
0.0522	0.0949	0.0775	0.0868	0.0993	0.1876

I

1	0	0	0	0	0
0	1	0	0	0	0
0	0	1	0	0	0
0	0	0	1	0	0
0	0	0	0	1	0
0	0	0	0	0	1

I-A

0.8421	-0.0088	-0.1964	-0.0123	-0.0040	-0.0175
-0.0020	0.9323	-0.0062	-0.0800	-0.0364	-0.0046
-0.0716	-0.0130	0.7178	-0.0352	-0.0249	-0.0823
-0.1015	-0.1673	-0.0832	0.6252	-0.3373	-0.1191
-0.0105	-0.0732	-0.0227	-0.0624	0.8569	-0.0798
-0.0522	-0.0949	-0.0775	-0.0868	-0.0993	0.8124

inv(I-A)

1.231106783	0.040323116	0.35481605	0.065425762	0.052510136	0.077424573
0.030902989	1.117251949	0.04613091	0.164664268	0.119254938	0.047457571
0.154680674	0.074257207	1.475291452	0.133380542	0.120689196	0.184658845
0.283968326	0.434661437	0.358489363	1.813540332	0.788994732	0.388216194
0.055091771	0.14865949	0.093853841	0.173788421	1.263393643	0.161165353
0.134514781	0.204798155	0.218681483	0.251132596	0.267585062	1.320246956

Sum = 1.82160642 (Forward Linkage Multiplier)

Sum = 1.890265324 (Backward Linkage Multiplier)

Backward Multipliers

The High Backward-Multiplier Sectors

Backward Linkage in a Period 1975		Backward Linkage in a Period 1980	
1 Slaughtering (042)	2.7194	1 Slaughtering (042)	2.5937
2 Unclassified (180)	2.5012	2 Animal Food (061)	2.3599
3 Leather Products (075-077)	2.3433	3 Textile Products (070-074)	2.3585
4 Animal Food (061)	2.3274	4 Public Works and Other Construction (140-144)	2.3182
5 Textile Products (070-074)	2.3022	5 Leather Products (075-077)	2.3018
6 Cement and Concrete Products (102-103)	2.2763	6 Spinning, Weaving and Bleaching (067-069)	2.2722
7 Spinning, Weaving and Bleaching (067-069)	2.2209	7 Building Construction (138-139)	2.2519
8 Public Works and Other Construction (140-144)	2.2118	8 Cement and Concrete Products (102-103)	2.2321
9 Building Construction (138-139)	2.1998	9 Electricity and Gas (135-136)	2.1692
10 Livestock (018-023)	2.1598	10 Rice and Other Grain Milling (049-052)	2.1687
11 Printing and Publishing (083)	2.1396	11 Printing and Publishing (083)	2.1530
12 Electricity and Gas (135-136)	2.1066	12 Other Foods (053-054, 056-060)	2.1498
13 Rice and Other Grain Milling (049-052)	2.0978	13 Livestock (018-023)	2.0896
14 Sugar Refineries (055)	2.0721	14 Sugar Refineries (055)	2.0751
15 Saw Mills and Wood Products (078-080)	2.0601	15 Non-ferrous Metal (107)	2.0663
16 Other Foods (053-054, 056-060)	2.0510	16 Rubber Products (095-097)	2.0596
17 Rubber Products (095-097)	2.0477	17 Motor Vehicles and Repairing (125-127)	2.0497
18 Paper and Paper Products (081-082)	2.0114	18 Paper and Paper Products (081-082)	2.0233
19 Processing and Preseriving of Foods (043-048)	2.0006	19 Processing and Preseriving of Foods (043-048)	2.0118
		20 Saw Mills and Wood Products (078-080)	2.0102
Backward Linkage in a Period 1985		Backward Linkage in a Period 1990	
1 Slaughtering (042)	2.7558	1 Slaughtering (042)	2.6673
2 Leather Products (075-077)	2.4250	2 Unclassified (180)	2.6460
3 Livestock (018-023)	2.3068	3 Textile Products (070-074)	2.4020
4 Animal Food (061)	2.3026	4 Rice and Other Grain Milling (049-052)	2.2997
5 Rice and Other Grain Milling (049-052)	2.3019	5 Animal Food (061)	2.2571
6 Public Works and Other Construction (140-144)	2.2982	6 Livestock (018-023)	2.2424
7 Spinning, Weaving and Bleaching (067-069)	2.2731	7 Leather Products (075-077)	2.2281
8 Building Construction (138-139)	2.2709	8 Public Works and Other Construction (140-144)	2.1810
9 Textile Products (070-074)	2.2547	9 Rubber Products (095-097)	2.1707
10 Rubber Products (095-097)	2.2421	10 Sugar Refineries (055)	2.1475
11 Cement and Concrete Products (102-103)	2.1719	11 Building Construction (138-139)	2.1175
12 Fishery (028-029)	2.1364	12 Processing and Preseriving of Foods (043-048)	2.1114
13 Other Foods (053-054, 056-060)	2.1364	13 Spinning, Weaving and Bleaching (067-069)	2.1079
14 Processing and Preseriving of Foods (043-048)	2.1307	14 Other Foods (053-054, 056-060)	2.1028
15 Restaurants and Hotels (147-148)	2.1234	15 Restaurants and Hotels (147-148)	2.0709
16 Saw Mills and Wood Products (078-080)	2.0948	16 Printing and Publishing (083)	2.0320
17 Other Non-metallic Products (099-101, 104)	2.0841	17 Cement and Concrete Products (102-103)	2.0286
18 Non-Metal Ore (036-041)	2.0394	18 Other Non-metallic Products (099-101, 104)	2.0032
19 Printing and Publishing (083)	2.0349		

The High Backward-Multiplier Sectors

Backward Linkage in a Period 1995

1	Slaughtering (042)	2.7367
2	Unclassified (180)	2.3783
3	Livestock (018-023)	2.3645
4	Animal Food (061)	2.3553
5	Textile Products (070-074)	2.2750
6	Rice and Other Grain Milling (049-052)	2.2691
7	Processing and Presering of Foods (043-048)	2.2658
8	Rubber Products (095-097)	2.2077
9	Leather Products (075-077)	2.1528
10	Building Construction (138-139)	2.1172
11	Other Foods (053-054, 056-060)	2.1101
12	Public Works and Other Construction (140-144)	2.1070
13	Spinning, Weaving and Bleaching (067-069)	2.0819
14	Cement and Concrete Products (102-103)	2.0431
15	Restaurants and Hotels (147-148)	2.0392
16	Other Non-metallic Products (099-101, 104)	2.0127
17	Sugar Refineries (055)	2.0099

Backward Linkage in a Period 1998

1	Slaughtering (042)	2.7194
2	Animal Food (061)	2.6222
3	Livestock (018-023)	2.4273
4	Textile Products (070-074)	2.3257
5	Building Construction (138-139)	2.3030
6	Rice and Other Grain Milling (049-052)	2.3018
7	Processing and Presering of Foods (043-048)	2.2953
8	Unclassified (180)	2.2924
9	Rubber Products (095-097)	2.2447
10	Leather Products (075-077)	2.1607
11	Sugar Refineries (055)	2.1502
12	Public Works and Other Construction (140-144)	2.1436
13	Spinning, Weaving and Bleaching (067-069)	2.1369
14	Other Foods (053-054, 056-060)	2.1245
15	Restaurants and Hotels (147-148)	2.1104
16	Motor Vehicles and Repairing (125-127)	2.0745
17	Saw Mills and Wood Products (078-080)	2.0733
18	Other Non-metallic Products (099-101, 104)	2.0625
19	Paper and Paper Products (081-082)	2.0511
20	Non-Metal Ore (036-041)	2.0425
21	Cement and Concrete Products (102-103)	2.0359
22	Transportation (149-158)	2.0294
23	Other Manufacturing Products (129-134)	2.0234
24	Business Services (164)	2.0003

Backward Linkage in a Period 2000

1	Slaughtering (042)	2.6563
2	Animal Food (061)	2.5872
3	Building Construction (138-139)	2.5532
4	Unclassified (180)	2.4434
5	Rice and Other Grain Milling (049-052)	2.3533
6	Processing and Presering of Foods (043-048)	2.3465
7	Textile Products (070-074)	2.3312
8	Livestock (018-023)	2.3095
9	Other Foods (053-054, 056-060)	2.2602
10	Business Services (164)	2.2190
11	Rubber Products (095-097)	2.1878
12	Public Works and Other Construction (140-144)	2.1687
13	Motor Vehicles and Repairing (125-127)	2.1479
14	Transportation (149-158)	2.1394
15	Printing and Publishing (083)	2.1220
16	Leather Products (075-077)	2.1193
17	Restaurants and Hotels (147-148)	2.1138
18	Spinning, Weaving and Bleaching (067-069)	2.1111
19	Cement and Concrete Products (102-103)	2.0890
20	Other Non-metallic Products (099-101, 104)	2.0782
21	Sugar Refineries (055)	2.0622
22	Fishery (028-029)	2.0333
23	Other Manufacturing Products (129-134)	2.0240
24	Electrical Machinery and Apparatus (116-122)	2.0155
25	Saw Mills and Wood Products (078-080)	2.0072

Backward Linkage in a Period 2005

1	Slaughtering (042)	2.8047
2	Building Construction (138-139)	2.6366
3	Animal Food (061)	2.6079
4	Unclassified (180)	2.4358
5	Rice and Other Grain Milling (049-052)	2.4202
6	Livestock (018-023)	2.3478
7	Public Works and Other Construction (140-144)	2.3469
8	Textile Products (070-074)	2.3062
9	Processing and Presering of Foods (043-048)	2.2817
10	Other Foods (053-054, 056-060)	2.2806
11	Business Services (164)	2.2650
12	Rubber Products (095-097)	2.2463
13	Motor Vehicles and Repairing (125-127)	2.2269
14	Leather Products (075-077)	2.1918
15	Cement and Concrete Products (102-103)	2.1764
16	Other Non-metallic Products (099-101, 104)	2.1589
17	Saw Mills and Wood Products (078-080)	2.1471
18	Spinning, Weaving and Bleaching (067-069)	2.1257
19	Fishery (028-029)	2.1098
20	Sugar Refineries (055)	2.0979
21	Restaurants and Hotels (147-148)	2.0939
22	Transportation (149-158)	2.0863
23	Non-Metal Ore (036-041)	2.0359
24	Paper and Paper Products (081-082)	2.0349
25	Vegetables and Fruits (007-008)	2.0265
26	Other Chemical Products (087-092)	2.0227

Forward Multipliers

The High Forward-Multiplier Sectors

Forward Linkage in a Period 1975

1	Trade (145-146)	11.1388
2	Petroleum Refineries (093-094)	4.2150
3	Transportation (149-158)	3.6653
4	Crude Oil and Coal (030-031)	2.9132
5	Spinning, Weaving and Bleaching (067-069)	2.6417
6	Basic Chemical Products (084,086)	2.5465
7	Paddy (001)	2.4652
8	Iron and Steel (105-106)	2.4368
9	Rice and Other Grain Milling (049-052)	2.2873
10	Paper and Paper Products (081-082)	2.1717
11	Other Crops (003, 005, 010-015,017, 024)	2.1371

Forward Linkage in a Period 1980

1	Trade (145-146)	10.7561
2	Petroleum Refineries (093-094)	5.5853
3	Transportation (149-158)	3.7044
4	Crude Oil and Coal (030-031)	3.2046
5	Spinning, Weaving and Bleaching (067-069)	2.7582
6	Paper and Paper Products (081-082)	2.4474
7	Basic Chemical Products (084,086)	2.3776
8	Other Crops (003, 005, 010-015,017, 024)	2.2630
9	Iron and Steel (105-106)	2.2003
10	Paddy (001)	2.1766

Forward Linkage in a Period 1985

1	Trade (145-146)	9.1943
2	Transportation (149-158)	4.9038
3	Petroleum Refineries (093-094)	4.7735
4	Crude Oil and Coal (030-031)	3.6363
5	Electricity and Gas (135-136)	2.8665
6	Other Crops (003, 005, 010-015,017, 024)	2.6041
7	Spinning, Weaving and Bleaching (067-069)	2.5958
8	Iron and Steel (105-106)	2.4994
9	Banking and Insurance (160-162)	2.4425
10	Basic Chemical Products (084,086)	2.3331
11	Paper and Paper Products (081-082)	2.0941

Forward Linkage in a Period 1990

1	Trade (145-146)	9.1873
2	Transportation (149-158)	3.8226
3	Petroleum Refineries (093-094)	3.4729
4	Banking and Insurance (160-162)	3.1048
5	Crude Oil and Coal (030-031)	2.5411
6	Basic Chemical Products (084,086)	2.5245
7	Electricity and Gas (135-136)	2.4996
8	Iron and Steel (105-106)	2.4471
9	Spinning, Weaving and Bleaching (067-069)	2.4225
10	Other Crops (003, 005, 010-015,017, 024)	2.3809
11	Paper and Paper Products (081-082)	2.2508

Forward Linkage in a Period 1995

1	Trade (145-146)	9.1344
2	Banking and Insurance (160-162)	4.2251
3	Transportation (149-158)	3.2250
4	Petroleum Refineries (093-094)	3.0622
5	Basic Chemical Products (084,086)	2.8203
6	Paper and Paper Products (081-082)	2.3895
7	Electricity and Gas (135-136)	2.3559
8	Crude Oil and Coal (030-031)	2.3411
9	Iron and Steel (105-106)	2.3313
10	Spinning, Weaving and Bleaching (067-069)	2.1677
11	Other Crops (003, 005, 010-015,017, 024)	2.1592
12	Paddy (001)	2.0033

Forward Linkage in a Period 1998

1	Trade (145-146)	10.3316
2	Banking and Insurance (160-162)	3.6320
3	Transportation (149-158)	3.5877
4	Petroleum Refineries (093-094)	3.4617
5	Basic Chemical Products (084,086)	2.9136
6	Crude Oil and Coal (030-031)	2.8738
7	Electricity and Gas (135-136)	2.7142
8	Paper and Paper Products (081-082)	2.4351
9	Electrical Machinery and Apparatus (116-122)	2.2820
10	Motor Vehicles and Repairing (125-127)	2.2048
11	Spinning, Weaving and Bleaching (067-069)	2.1877
12	Iron and Steel (105-106)	2.0888
13	Other Crops (003, 005, 010-015,017, 024)	2.0655
14	Paddy (001)	2.0180
15	Fertilizer and Pesticides (085)	2.0067

The High Forward-Multiplier Sectors

Forward Linkage in a Period 2000			Forward Linkage in a Period 2005		
1	Trade (145-146)	10.4971	1	Trade (145-146)	10.0195
2	Petroleum Refineries (093-094)	3.7881	2	Crude Oil and Coal (030-031)	4.3879
3	Crude Oil and Coal (030-031)	3.5052	3	Petroleum Refineries (093-094)	4.0720
4	Transportation (149-158)	3.4996	4	Electricity and Gas (135-136)	3.3728
5	Basic Chemical Products (084,086)	3.3649	5	Transportation (149-158)	3.3708
6	Electricity and Gas (135-136)	3.0543	6	Basic Chemical Products (084,086)	3.3258
7	Electrical Machinery and Apparatus (116-122)	2.6527	7	Banking and Insurance (160-162)	3.0693
8	Paper and Paper Products (081-082)	2.4950	8	Iron and Steel (105-106)	2.7802
9	Banking and Insurance (160-162)	2.3853	9	Electrical Machinery and Apparatus (116-122)	2.5956
10	Motor Vehicles and Repairing (125-127)	2.3018	10	Fertilizer and Pesticides (085)	2.2893
11	Iron and Steel (105-106)	2.1901	11	Paper and Paper Products (081-082)	2.1665
12	Other Chemical Products (087-092)	2.1629	12	Other Chemical Products (087-092)	2.0708
13	Fertilizer and Pesticides (085)	2.1476	13	Motor Vehicles and Repairing (125-127)	2.0084
14	Spinning, Weaving and Bleaching (067-069)	2.1160	14	Livestock (018-023)	2.0081
15	Other Crops (003, 005, 010-015,017, 024)	2.0429			